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ABSTRACT

The structure of the testing condition is an important variable in measuring young children's language comprehension. This study examined effects of two testing conditions on the language comprehension scores of 24 toddlers, mean age 20.3 months. The methodology was based on the rationale that a test which allows parents to select stimuli which enable their children to demonstrate understanding (unstructured condition) will demonstrate a higher level of comprehension than a test in which parents present a designated set of stimuli (structured condition). Results indicated a significant effect of structure in the predicted direction. Implications for measurement methodology are discussed. (Author/MV)

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Measuring Language Comprehension in Young Children: Does the Structure of the Testing Condition Affect Results?

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Measuring Language Comprehension

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Abstract

In measuring young children's language comprehension, effects of the structure of the testing condition is an important variable. The present study examined effects of two testing conditions on the language comprehension scores of 24 toddlers, mean age 20.3 months. The methodology was based on the rationale that a test which allows parents to select stimuli which enables their children to demonstrate understanding (unstructured condition) will demonstrate a higher level of comprehension than a test in which parents present a designated set of stimuli (structured condition). Results indicated a significant effect of structure in the predicted direction. Implications for measurement methodology are discussed.

Measuring Language Comprehension in Young Children

Does the Structure of the Testing Condition Affect Results?

Measurement of young children's understanding of language has begun to receive increasing attention. This is due in part to recent psycholinguistic research which points to the relationship of cognitive and language development during the first 2 years (see Brown review, 1973). The methodological problems involved in measurement of all aspects of young children's development are extensive. Language comprehension, in particular, has been difficult to measure in children under 2.

Recent studies of comprehension have focused on speech discrimination abilities, child responses to object names, word order and sentence structure, types of adult speech stimuli which may affect comprehension. Other issues to which attention has been addressed are the child's state of responsivity at the time of assessment and the conditions which affect the responsivity level.

Recent studies of infant listening have given evidence of the child's ability to discriminate speech during the first year of life (Eimas, Siqueland, Jusczyk, and Vigorito, 1971; Turnure, 1971; Moffit, 1971; Horowitz, 1974).

Studies of comprehension using child responses to varied structural qualities of speech stimuli are becoming increasingly precise (Shipley, Smith, and Gleitman, 1969; Friedlander, 1970; Clarke-Stewart, 1973; Nelson, 1973; White and Watts, 1973; Chapman and Miller, 1975; Goldin-Meadows, et al, 1976). These studies have provided useful methodological approaches to receptive language questions and have indicated results which point to the crucial nature of early comprehension. For example, Nelson found comprehension in toddlers was positively related to all later indices of language production maturity. Many questions are still unanswered, however, as to the exact nature of the structural variables to which the child is responding.

A major difficulty in measuring toddlers' language behavior lies in the fact that early language learning is related to the cultural and the idiosyncratic environment provided by particular parents (Brown, 1958). Nelson's analysis (1973) of children's first words points to the idiosyncratic quality of early language organization and the influence of parental style on its referential nature.

Children's responses to speech stimuli may be affected by the structural qualities of the stimuli selected by adults. Studies of mother-child verbal interaction usually show adult adaptation of speech to meet children's developmental level (Clarke-Stewart,

1973; Snow, 1972; Bellinger, Note 1). Few studies of father-child verbal interaction patterns have been conducted. A recent one reports fathers to be similar to mothers in type of stimuli they provide in a laboratory setting (Ames and Golinkoff, Note 2) while in home studies fathers' lower level of quantity of verbal interaction has been reported (Rebelsky and Hanks, 1971).

Child sex differences also may be demonstrated in early language performance. McCarthy's review (1954) indicated girls' language production was higher at early age levels. Maccoby and Jacklin (1973) state that recent studies are inconclusive and call for renewed attention to this question. Whether different methods of testing affect boys and girls differentially has not been studied.

For young children, affectivity and cognition are so closely tied that attempts to measure understanding are often hampered by problems related to the child's responsiveness to and familiarity with the tester (Zigler, Abelson, Seitz, 1973). They suggest tests "should be administered by an E with whom the child is familiar and toward whom he has positive feelings" (page 301).

Testers of infants and toddlers have long recognized this factor and often have the parent present during the testing session (Frankenburg, et al., 1973). Also reliance on parental

report presumably corrects for the child's failure to perform in an unfamiliar setting (Bzoch and League, 1973). Sometimes the mother has been used as the tester (Shipley, et al., 1969; White and Watts, 1973) and she delivers prearranged stimuli or the observer records mother-child natural verbal interaction and analyzes this (Brown et al., 1970). When the testing is done in the home, however, other variability is increased. White and Watts (1973) mention noise level and confusion in the home or interference by siblings as examples of confounding variables.

Affective variables related to the child's developmental level are also noted. White and Watts (1973) indicate that between 15-20 months many children are gaining increased autonomy and discovering the word "no." They may also be especially uncooperative in the presence of strangers. The interest span of children of this age level is also likely to be very short and this must be considered in the design of testing of children in this age range.

Therefore, intermittant changes in the emotional state of children may greatly affect their performance on any measure of their ability.

Researchers concerned primarily with early infancy have concluded that a measure of infant state is essential because

state changes within the individual infant will influence the behavioral results. Also results must be comparable across subjects. Therefore, they have developed state scales which give a rating of the infant's level. Infant state can range from deep sleep to active crying. Infants are rated on this dimension when the experimental procedure is about to begin and throughout the experiment. An example of a state scale is that of Brackbill and Fitzerald (1969). Brazelton's scale (1965) takes into account the child's state and also counts the optimum response rather than the first response of a series. Because responsivity does affect test validity, a measure of toddler responsivity may be a useful addition to testing procedures.

Testing techniques for measuring language comprehension in toddlers have usually followed one of the two models: one approach uses parental report combined with child observation (for example, the Bzoch-League REEL Scale, 1971); the other approach uses a set of standard speech stimuli given by the child's parent or by an other adult with parent present (for example, Shipley, et al, 1969). Because tests sample from a universe of behavior, the specific words, phrases, or sentences used by the tester may not be crucial. What may be more important is that the tester be able to demonstrate the child's comprehension through

selecting speech stimuli to which the child can respond appropriately and which can be measured systematically.

The objective of the present study was to examine the effects of speech stimuli structure, parent sex, and child sex on a measure of language comprehension. Because of the factors discussed in the literature, it was predicted that the children's scores would be higher in the situation where parents selected the speech stimuli.

Method

Subjects and Setting

Twenty-four toddlers, 12 boys (mean age 20.3 months, range 15.9-24.6) and 12 girls (mean age 20.3 months, range 15.1-24.8), and their parents participated in the study. Parental education ranged from high school graduation to doctoral level, with the majority having had some college training. Income level was in the lower middle to upper range. Parents were asked to participate in the study and were given a small stipend for their participation. Two families who were asked did not wish to participate. The setting was the play activity room in the Toddler Program building at the Matthew R. Lowry Early Childhood Center, Oakland University, which was familiar to children and parents.

Design

The study explored the effects of parent sex, child sex, and parental speech stimuli structure condition by means of a crossed repeated measures design. Child subjects were nested within sex with all subjects receiving all treatment combinations. Order of measures was not a variable because the possible permutations of order were randomized across subjects.

Procedures

A session of approximately 25 minutes was held with each child. During the session each parent presented the structured and the unstructured stimuli conditions. The order of the conditions (mother/structured, father/structured, mother/unstructured, father/unstructured) was randomly prearranged for each child. The parent not presenting a condition stayed in a closed room away from the testing area. Sessions were videotaped unobtrusively.

Directions for speech stimuli conditions were given to parents on 4x6 cards immediately before the required segment was taped. Each parent read the directions while the child played in the room. Parents' questions which were asked to clarify the instructions were answered by restating the directions on the cards. The sessions began when the parents indicated they were ready.

Two structure conditions were used. In the structured condition parents were asked to deliver twenty speech stimuli ranging from single words ("ball") through telegraphic toddler grammar ("where ball?") to well-formed simple and complex sentences ("Let me give dolly a kiss.") ("Put the ball on the car."). All speech stimuli related to three objects--a ball, a doll, and a car--which were on a low table at which child and parent sat. Any stimulus could be repeated once and the parent was asked to pause after each stimulus to give the child a chance to respond (either verbally or motorically). Parents were allowed to use variable minimal verbal reinforcement ("okay", "yes", or other similar statement) but could not use gestures. After the parent had completed this list of stimuli, the condition was completed. Thus, the structured condition was designed so that the same speech stimuli concerning specific objects and tasks were given to the child by each parent. Speech stimuli, objects, and tasks were held constant across adult speakers.

In the unstructured condition, directions to parents began: "You probably know some things your child understands. Try to get him/her to demonstrate some of them." Parents were asked to demonstrate their child's language understanding by using whatever speech stimuli, objects, or tasks they chose but

without using gestures. They could select any objects in the room or could elect to use no objects. Directions as to number of times the speech stimuli could be repeated, the reinforcement method, and the timing of stimuli to allow response were the same as those for the structured condition. Thus, the unstructured condition was designed so parents determined the stimuli to which their child would respond in a manner that would demonstrate understanding. Speech stimuli, objects, and tasks differed across adult speakers. A five minute segment of the unstructured condition was videotaped.

Child responses were coded on three dimensions across all conditions. These were motor, verbal, and socio-emotional response dimensions. Motor and verbal coded responses were scored according to response to speech stimuli. A score of 0 was given for no verbal or motor response; 1 for an irrelevant response, 2 for a correct but partial response (for example action correct but with incorrect object) and 3 for a correct, complete, or extended response. The motor and verbal response scores were combined to form the language comprehension score which was the dependent variable. The socio-emotional score served as a measure of child responsivity level, and was scored 1, 2, 3 corresponding to avoidance; netural, or approach to task. Since 2.0 would be a chance mean score and would indicate an "approach" to the task half the time 2.5 was selected as the

score which would indicate a high child responsivity level.

Plan of Analysis

As the first step in the coding process, the units of speech stimuli in the unstructured condition which were comparable to the structured stimuli were determined. The structured condition was used as the standard with those speech stimuli listed in the directions being the 'countable' ones. Child behavior management comments, side comments to experimenter, or adult reinforcement or thinking aloud were not considered countable.

For the unstructured condition, all adult speech stimuli were transcribed and categorized as countable or noncountable. Only stimuli which were task related and comparable with structured condition standards were counted. The countable stimuli up to 40 were scored in the unstructured condition. In the structured condition, all countable stimuli were used, but because some parents repeated more of the 20 stimuli than others did, the total number ranged between 30 and 40 stimuli. Mean length of utterance for each adult was also determined.

The dependent variable for analysis was the language comprehension score. Because of the slight variations in number of speech stimuli in each condition the data were transformed into mean scores which were used in the analysis. A three way analysis of variance mixed model, crossed, and nested was planned for testing all hypotheses. To assure that the assumption of

homogenity among levels of the repeated measures was met, pairwise correlations were computed for all conditions. These were within a 15 point range (.73 to .87), thus the planned analysis was judged appropriate.

Results

Reliability of Observations

Three coders working independently were used to determine reliability. The percentage of intercoder agreements was calculated by dividing the number of agreements by the number of agreements plus the number of disagreements. Intercoder reliability on countability ranged from 94% to 97% with a mean of 96% and on MLU from 93% to 95% with mean of 94%. Reliability on the three coded dimensions (motor, verbal, socio-emotional) ranged from 92% to 96% with a mean of 94%. After reliability levels were established, responses were coded for all taped segments for all subject.

Language Comprehension Results

The language comprehension scores in the unstructured condition were significantly different from scores in the structured condition, but no sex effects reached significance.

The mean language comprehension scores for each condition are shown in Table 1.

Insert Table 1 about here

The analysis of variance indicated a significant structure effect, $F(1,22) = 44.378, < .001$. Children scored consistently higher in the unstructured condition in which parents selected the speech stimuli. This finding is in the predicted direction.

The analysis of variance indicated no significant child sex effect, $F(1,22) = .044$. Variation within sex was high with scores ranging from 1.412 to 4.825 for boys and from 1.626 to 4.65 for girls. This within sex variation contributes to the nonsignificant results of between sex variation.

Fathers and mothers did not differ significantly in ability to demonstrate their child's language comprehension $F(1,22) = .38$), indicating that sex of the parent providing the speech stimuli was not a major factor in the children's language comprehension scores. There were no significant interactions among variables. Table 2 gives the analysis of variance data.

Insert Table 2 about here

Analysis of the speech stimuli in the parent designed test (unstructured condition) gave indications that this condition may have also required a deeper level of comprehension from the child. Parents' MLU in the structured condition was 3.45 while their MLU in unstructured was 5.34. That is, parents usdd longer sentences when they selected the speech stimuli.

Correlation of adult MLU and language comprehension score in the unstructured condition was $r = .565$, $p < .025$ in the direction of longer sentences being paired with higher comprehension. This result gives some support to studies indicating adult modification of speech to meet child ability needs.

The structured condition also included fewer types of sentence structure. Although wh-questions, personal pronouns and both primary and secondary verbs were included in the preset stimuli there were no indefinite pronouns, conjunctions, negatives or interrogative reversals. In the unstructured condition, parents also used indefinite pronouns in 34% of the sentences, interrogative reversals in 24% and negatives and conjunctions were in 6%. Parents used complete sentences 92% of the time in the unstructured condition.

The speech stimuli was scored according to the Developmental Scoring System (Lee, 1974), which is design to rate children's spontaneous speech, in order to compare the overall level of comprehension required in the two conditions. The structured condition was rated as 2.09 while the mean of the unstructured condition was 6.61.

Children's responsivity level was also higher in the unstructured condition, although responsivity level was above 2.5 for the majority of children. Eleven children received high

responsivity scores but low language comprehension scores which indicates that the low score was not due to lack of responsivity. Four children received low comprehension scores and low responsivity scores. If the test had been used for identification of language problems, these children would have needed an additional assessment.

Discussion

Parents asked to demonstrate their child's language comprehension are able to perform as testers in both a condition where they deliver present speech stimuli and in a condition where they are allowed to select the speech stimuli that they believe will demonstrate what their child understands.

Using parents as the testers who select the stimuli to which the child responds may be a method which can demonstrate toddlers' language comprehension effectively. This method may provide a type of "culture fair" test, in which the adult can provide familiar stimuli to which the child can respond, and which can be objectively scored. Parental report of their children's language understanding has been used extensively in measuring development. Parental demonstration of this early comprehension in a systematically controlled way, can provide an objective means of extending knowledge of language development. In combination with a structured test, it can also broaden the scope of

initial assessment.

The study also provides evidence that fathers and mothers are equally able to demonstrate their toddlers' language comprehension. Since fathers generally spend less time with their children, the importance of the quality of interaction rather than quantity gains support. There are a number of interesting questions raised by this finding. Fathers' ability to demonstrate their children's comprehension may be specific to the population of middle class fathers in the study. They were highly verbal and very much at ease when required to be alone with their children. Working class fathers might be less able to demonstrate their children's comprehension if they have not usually been participants in interaction with their children at this early age level.

There is no evidence that language comprehension of boys and girls of toddlers age differs. Although the research literature is inconclusive, girls' early language production may be greater than boys. It is probable that boys and girls do not differ in employing what Nelson (1973) calls 'the conservative strategy of language acquisition --comprehension. It is also possible that the ability of parents to know what speech stimuli would be salient for their boys made it more likely that the boys would respond at a high level. For example, the stimuli provided by parents of motorically active boys often required large muscle responses.

This methodology might be useful for determining language disability at early age levels. The range of normal development in language production is very wide; and therefore language disability is often hard to distinguish from normal development. The range of normal development of language comprehension is not presently known. The period when the crucial aspects of language comprehension occur may be of a shorter, more intense time span then that of production. The developmental progression of comprehension has not yet been thoroughly charted. The methodology discussed here might provide one avenue by which to explore developmental landmarks of comprehension. For example, parents might be asked to select speech stimuli which fits into a particular linguistic structure so that children's comprehension of specific morphological or syntactic qualities could be measured.

The study utilized a selective sample and thus results are not presently generalizable to other parent-child populations. Until the study is replicated with parents and children of other socio-economic and cultural conditions, the usefulness of the findings are limited. Comparison of the predictive value of the tests of different structure must also be made. However, the study does raise some questions which should be addressed by measurement specialists.

Many of the assumptions underlying testing with structured instruments can not be met when young children are the subjects. Testing methodology has not focused on the special problems of testing young children. In fact, measurement specialists have often been resistant to the idea that new testing paradigms might be needed. They have often forced young children into the available structured testing modes or have dismissed the problem by declaring these children untestable on many developmental dimensions.

The influence of structural conditions on the measurement of young children's development must be explored, because it is an important educational and scientific issue. Testers should be aware of the limitations of structured testing conditions and should be investigating alternative measurement paradigms appropriate for young children. As more and more programs are developed for young children the need to address this issue is becoming crucial.

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1. Ames, G. J., & Golinkoff, R. M. Do fathers use 'motherese'". Paper presented at Biennial Convention of the Society for Research in Child Development, New Orleans, April 1977.

2. Bellinger, D. The pragmatic structure of mothers' directives. Paper presented at Biennial Convention of the Society for Research in Child Development, New Orleans, April 1977.

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Footnote

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Table 1

Mean Language Comprehension Scores for

Structure Condition, Child Sex and Parent Sex

		Condition	
Group	n	Structured	Unstructured
Girls	12		
with Fathers		2.57	3.05
with Mothers		2.78	3.08
Boys	12		
with Fathers		2.50	3.14
with Mothers		2.50	3.08

Note Maximum score = 6

Table 2

Analysis of Variance for Effects of Child Sex, Parent Sex, Structure Condition, and of Interactions On Language Comprehension Score

Source	df	SS	MS	F
Child Sex (A)	1	.105	.105	.044
Error	22		2.384	
Parent Sex (B)	1	.045	.045	.375
Error	22		.120	
Str. vs. Unstr. (C)	1	5.991	5.991	44.378*
Error	22		.135	
A X B	1	.12	.120	1.000
Error	22		.120	
A X C	1	.289	.289	2.141
Error	22		.135	
B X C	1	.091	.091	.551
Error	22		.165	
A X B X C	1	.016	.016	.097
Error	22		.165	

* $P < .001$